

Titanium Boride (TiB) Hardening Technology

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- **Technologies, applications, & current product evaluations**
- **Licensing & commercialization pathways**
- **Utah spinout company**
 - Concept, IP, and function schematic
 - Formation, growth, and sustainability

Technologies, applications & current product evaluations

- **Surface hardening**

- Biomedical, bearings, gears, knives, gun barrels
 - Ortho Development, Rotek, American Engr. & Mfrg.

- **Bulk hardening**

- Armor, tool, dies, inserts
 - Oregon Ballistics, Armor Systems Int'l, Cercom, Ceradyne, Futura

Titanium Products for TiB Hardening

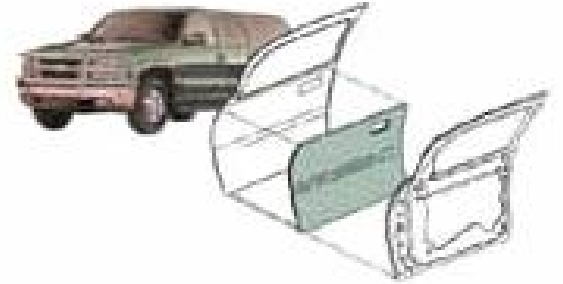
Biomedical



Aerospace Bearings



Armor



Titanium Hardware



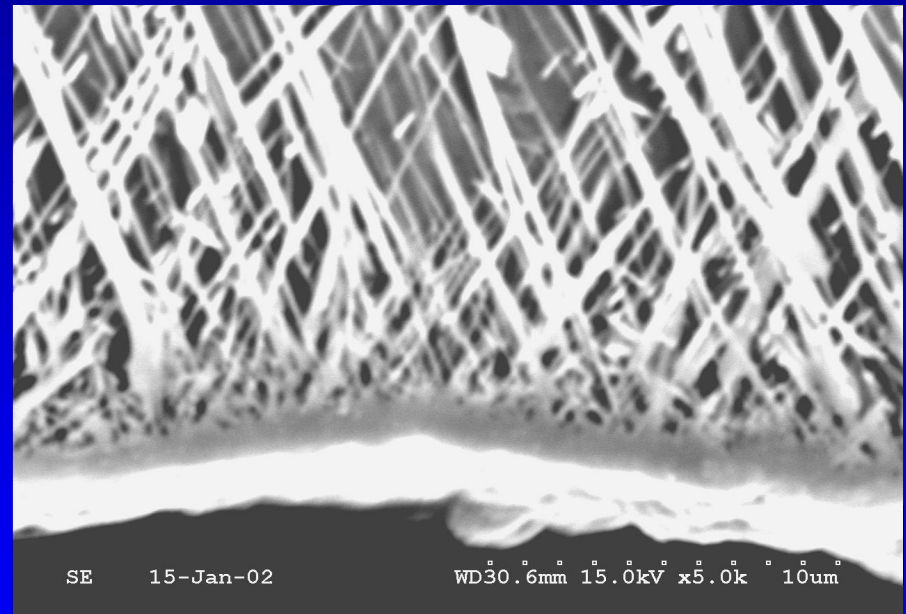
Aerospace Gears



Gun
Barrels

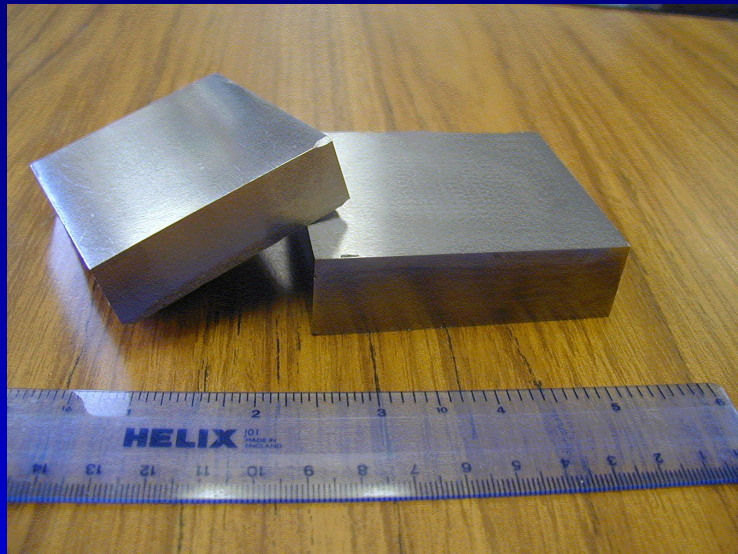
What is Titanium Boride Hardening?

A process to create uniquely structured TiB Hardened Surface Layer

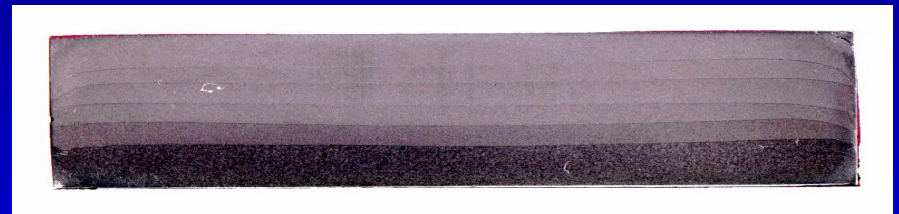
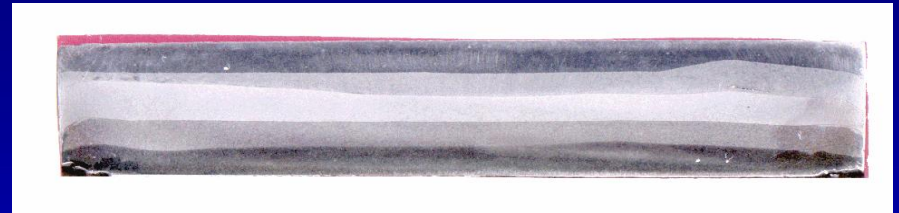


Nanostructured & resembling
“nails” through the surface

What is TiB Hardened Graded Armor Material?

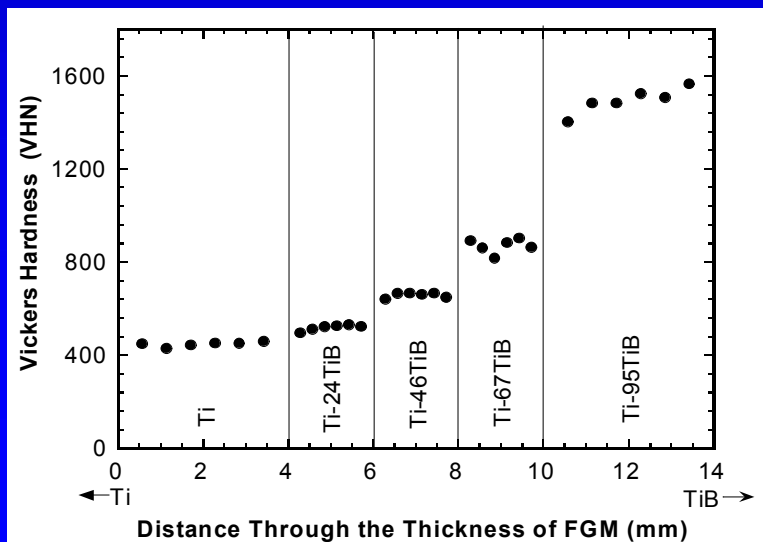


Ti-95%TiB Graded Armor plate

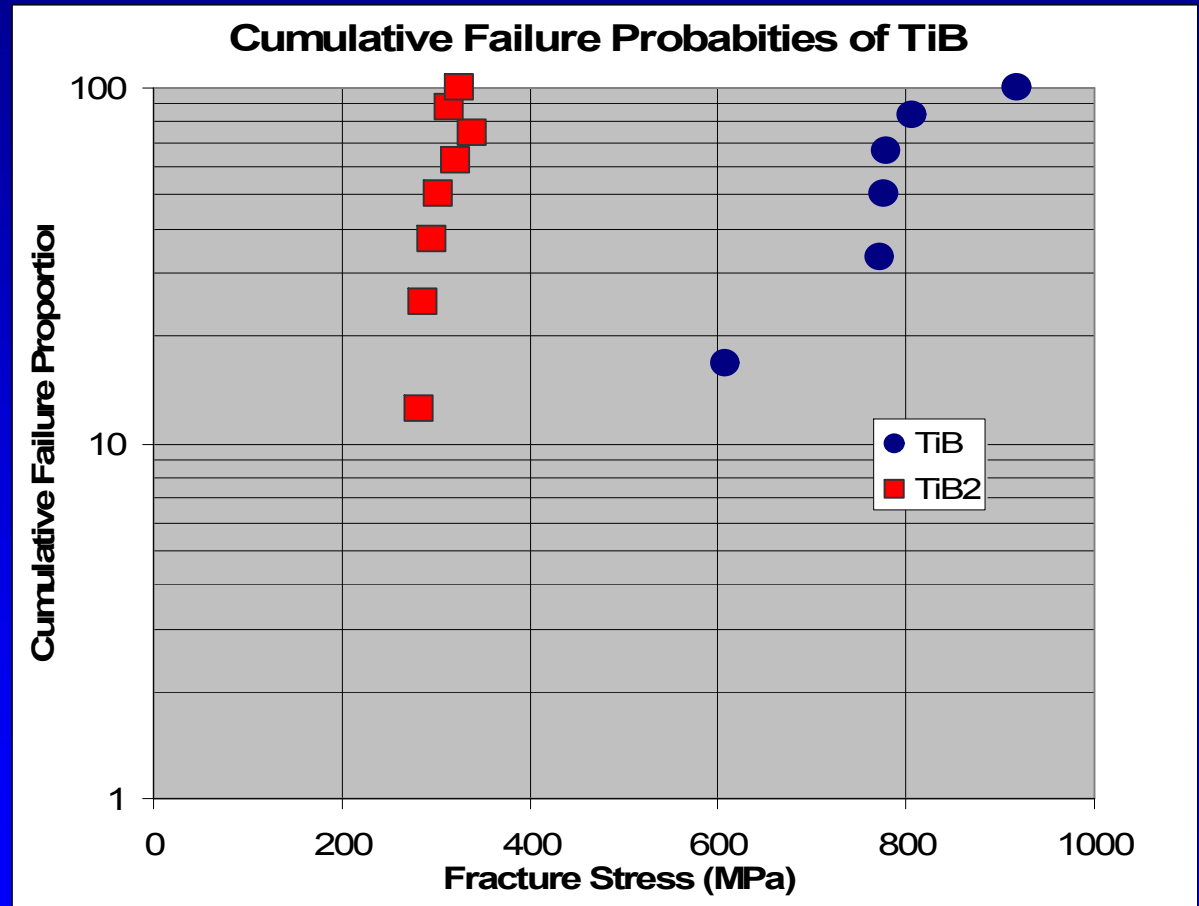
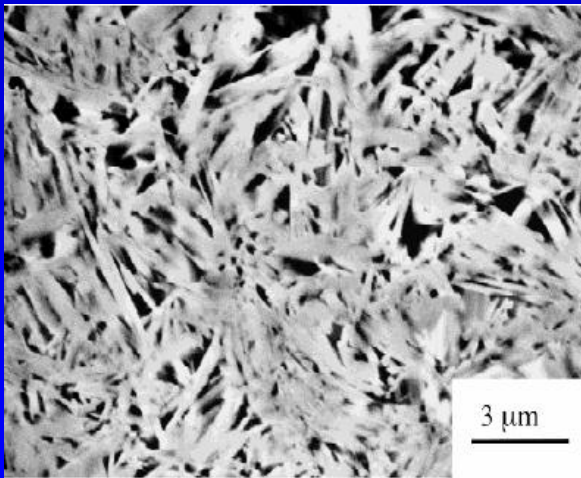
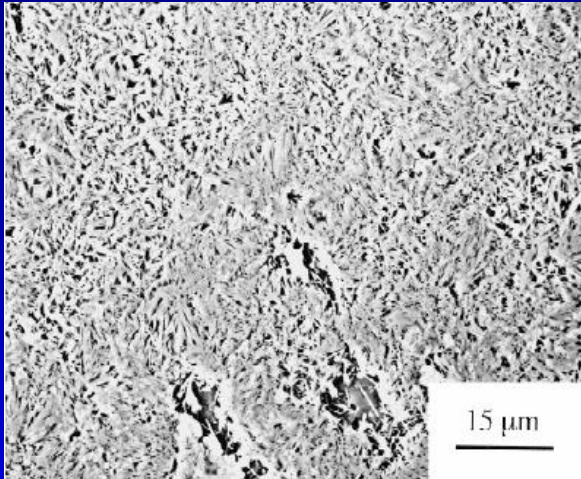


Ti-52%TiB Graded Armor plate

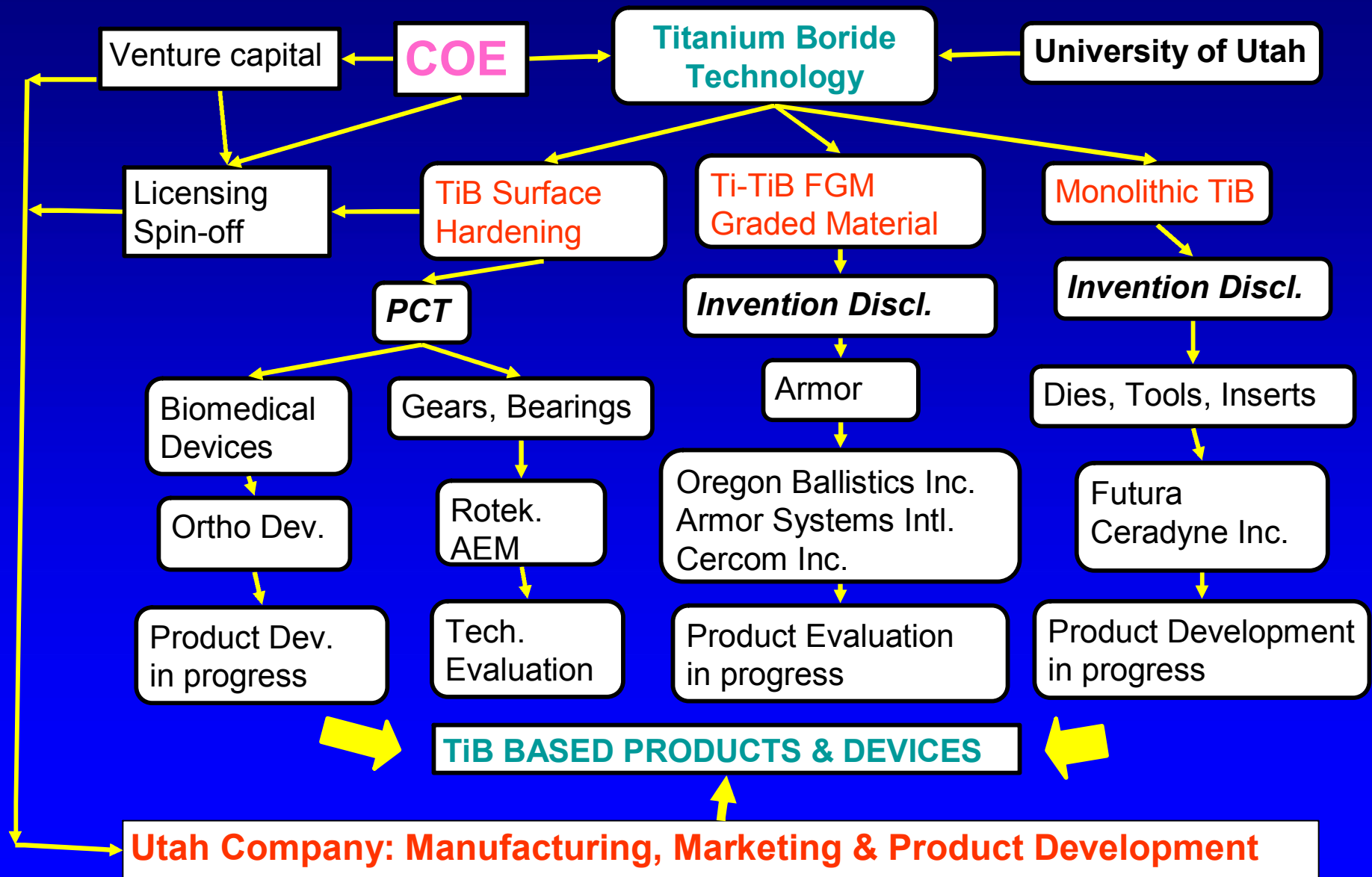
Hardness profile through thickness



What is Nanostructured Monolithic (almost) TiB Material ?



TiB Technology Commercialization & Spin-Off Developmental Plan

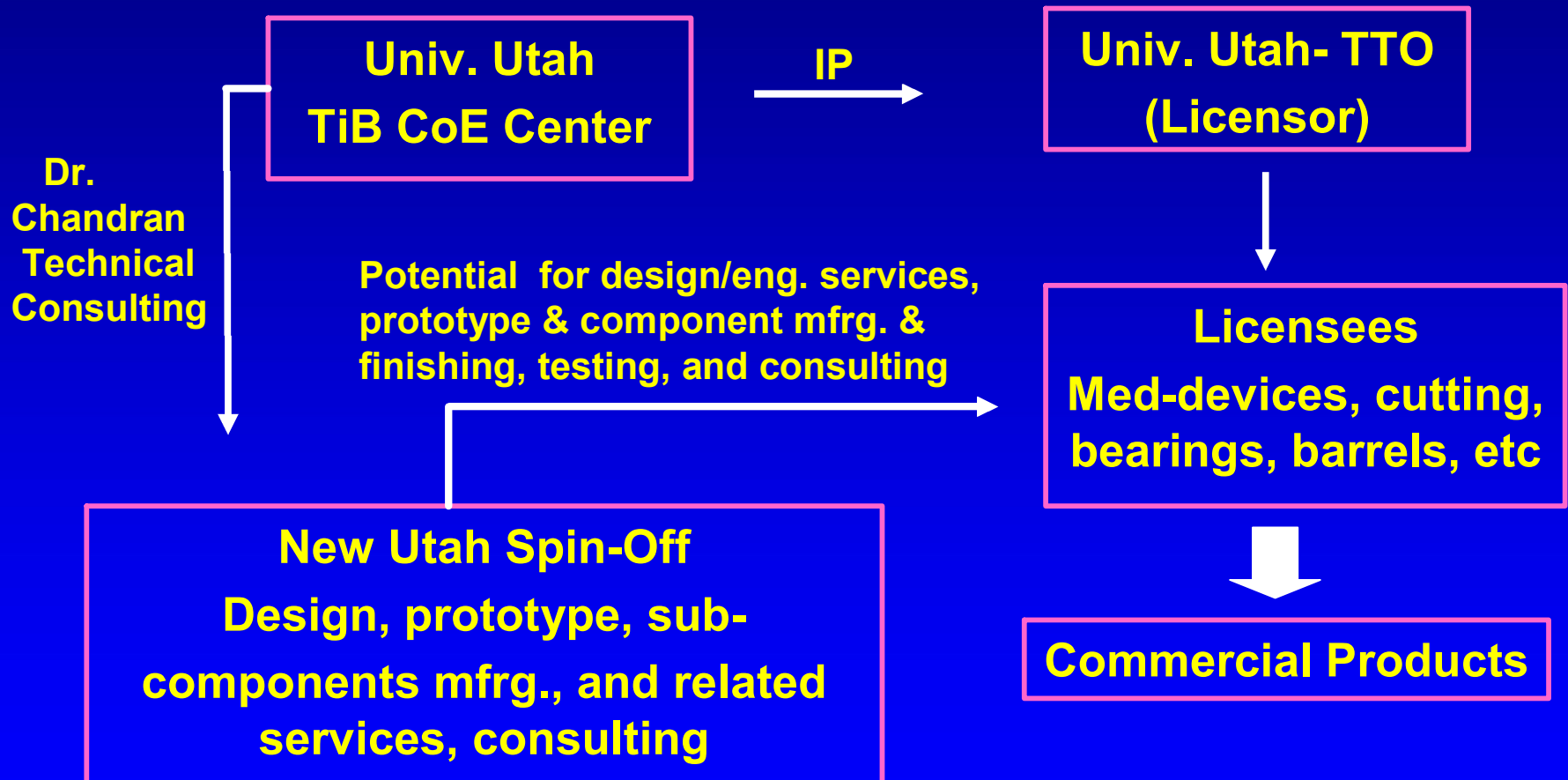


Licensing and commercial pathways

- Multiple fields of use favor licensing model to maximize revenues
- Lower Ti production costs and specialized, high-value applications driving market demand
- Need for pre-commercial prototype services via Utah-based spinout company to provide:
 - Design, metallurgy, engineering services
 - Processing & Treatment services
 - Polishing, grinding, forming, shaping, machining
 - Undertake high-value TiB component manufacturing
 - Prototype wear and durability testing
 - Full range of technical and production consulting services

Utah Spin-Off

(concept , IP, and functional schematic)



Utah Spinout Company




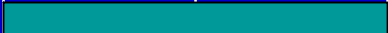
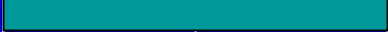


(formation, growth and sustainability)

- Formation planned during '05/'06 CoE funding cycle
- Relatively low startup investment required; quick payback
- Immediate, self-funding, profitable revenues
- Synergistically enhances & supports licensing activity
- Sustainable competitive advantage, based on know how.
- Scalable operations to include specialized, high-value component manufacturing.
- Create high-pay Utah jobs.

Example: Straw Utah Armor Company

Cost Item		Annual Revenues	Recurring Expenses	Yearly Profit
Equipment:	One time \$\$\$		10-yr Capital Amortization	
Hot Press	500,000		105,000 /yr.	
Tape casting unit	50,000			
Misc. Equipment	200,000			
Rent, utilities, etc.	200,000			
License, Fees	100,000			
Personnel, Raw Materials:	Annualized cost			
1 Supervisor	60,000			
2 entry level Engineers	80,000			
2 operators	50,000			
Raw Materials	1,000,000			
Interest on Capital	100,000		1,290,000	
Goods Sold:	Cost of Item:			
3000 Tank Armor	1,000	3,000,000		
5000 Body Armor	0,400	2,000,000		
100 Prototype Auto armor	1,000	100,000		
Net		5,100,000	2,185,000	2,915,000

CoE External Sponsorship

Product Focus	Yr. 1	Yr. 2	Yr. 3	Yr. 4	Yr. 5
Orthopedic Devices Ortho Development Corporation, UT					
Bearings American Eng. and Manuf., Rotek					
Armor Armor Systems International, WA Oregon Ballistics					
Dies, Tools Inserts Futura, others					
Gun Barrels, tracks US Army, Flowform Inc.					
Aerospace Gears Triumph Gear Systems, others					



Funded Research program in place



Initial discussion complete; research program to be agreed



Contact, Discussion underway



To be developed